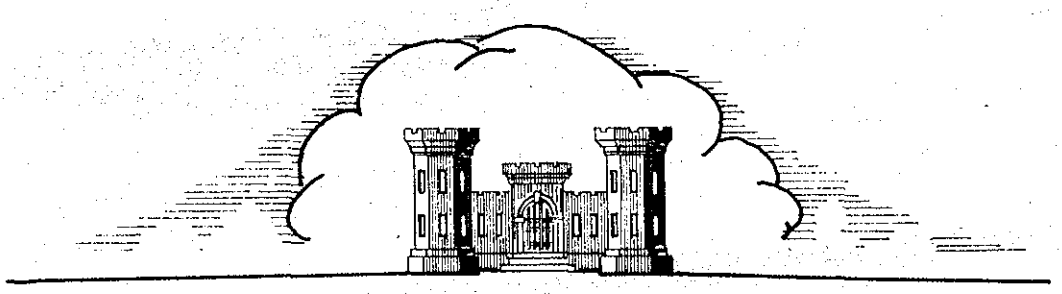
SCOTT'S BROOK

NORTH ATTLEBOROUGH, MASSACHUSETTS

PRELIMINARY EXAMINATION FOR FLOOD CONTROL



WAR DEPARTMENT CORPS OF ENGINEERS U. S. ARMY
U. S. ENGINEER OFFICE PROVIDENCE, R.I.

UNITED STATES ENGINEER OFFICE
PROVIDENCE, RHODE ISLAND
DECEMBER 1945

LOCATION MAP

SCALE: 1 IN. = 18 MI.

LEGEND

- Drainage Area Scott's Brook
- Blackstone River Basin
- Existing Dams
- U.S. Highway
- State Highway
- Railroad
- State Boundaries

INDEX MAP
BLACKSTONE RIVER BASIN
MASSACHUSETTS AND RHODE ISLAND

SCALE: 1:100,000

U. S. ENGINEER OFFICE, PROVIDENCE, R. I. DEC. 1945

SUBMITTED: SENIOR ENGINEER, HEAD REPORTS SECTION
APPROVAL RECOMMENDED: SENIOR ENGINEER, ACT. CHIEF ENGINEERING DIV.
APPROVED: COL. CORPS OF ENGINEERS, DISTRICT ENGINEER
PREPARED: REPORTS SECTION
DRAWN: J. T.
TRACED: D. H. R.
CHECKED:
TO ACCOMPANY PRELIMINARY EXAMINATION DATED 11 DEC. '45
FILE NO. BE-1-1010

INCL. 1

SCOTT'S BROOK

NORTH ATTLEBOROUGH, MASSACHUSETTS

PRELIMINARY EXAMINATION

UNITED STATES ENGINEER OFFICE

PROVIDENCE, RHODE ISLAND

DECEMBER 1945

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NOT FOR PUBLIC RELEASE

WAR DEPARTMENT
UNITED STATES ENGINEER OFFICE
PROVIDENCE, RHODE ISLAND

11 December 1945.

Subject: Preliminary examination for flood control on Scott's Brook, North Attleborough, Massachusetts.

To: The Chief of Engineers, U. S. Army, Washington, D. C. (through the Division Engineer, New England Division).

SYLLABUS

The District Engineer finds that Scott's Brook constitutes a flood hazard to a well-developed residential and industrial area. Protection against floods of frequent occurrence by the construction of a small detention reservoir is feasible. If the project is undertaken by the United States, the local authorities are willing to contribute up to 50 percent of the total costs involved. Preliminary investigations indicated that the benefits to be derived would be commensurate with the costs involved and, therefore, further investigation and report on the locality is warranted and a survey report is recommended.

1. Authority. - A review of the previous report on the Blackstone River, Massachusetts and Rhode Island, was authorized by a Resolution of the Committee on Flood Control of the House of Representatives, United States, adopted May 25, 1945 as follows:

> "Resolved.....that the Board of Engineers for Rivers and Harbors.....be, and is hereby requested to review the report on the Blackstone River, Massachusetts and Rhode Island, published in House Document No. 624, Seventy-eighth Congress, Second Session, with a view to determining whether improvement on Scott's Brook in Massachusetts in the interest of flood control is advisable at this time."

2. A separate report on Scott's Brook of preliminary examination scope conforming to the provisions of Orders and Regulations was authorized by 7th indorsement from Office, Chief of Engineers, dated 19 July 1945 to letter from the Chairman of the Committee on Flood Control of the House of Representatives to the Chief of Engineers, dated 25 May 1945. The project and benefits therefrom are extremely local in character and the problem is unrelated to the approved flood control project for the Blackstone River.

3. Prior reports. - There are no prior flood control reports on Scott's Brook, North Attleborough, Massachusetts.

4. Description. - Scott's Brook is a small stream which flows southeasterly through the southern part of the town of North Attleborough to join the Ten Mile River near the south boundary of the town. Ten Mile River flows into the tidal portion of the Blackstone River, known as the Seekonk River. The total length of Scott's Brook is approximately 2.6 miles and its drainage area is approximately 1.4 square miles. The character of the drainage area above the town limits is agricultural and wooded. Through the town limits the area is mainly residential which the stream traverses on a gradient which drops 32 feet in a distance of 1400 feet. In this distance are a railroad crossing and four street crossings

provided with culverts for the passage of the brook. The street crossing farthest downstream is the most important, being Washington Street and main highway U. S. Route No. 1A. Reference is made to the map and profile shown on Plates 1 and 2 for details.

5. The discharge capacities at critical points downstream from the railroad culvert were estimated from a reconnaissance survey to be as follows:

Location	Capacity in CFS
Railroad culvert	136
Broadway culvert	125
Avery Street culvert	167
Washington Street culvert	177

6. Below Washington Street Scott's Brook flows through the estate of Harry W. Fisher to join the Ten Mile River. This portion of Scott's Brook is restricted to a narrow channel averaging about 4 feet in width with rubble masonry side-walls not exceeding 4 feet in height, and is affected by backwater from a low dam in Ten Mile River a short distance below the junction with Scott's Brook. It is estimated that the channel capacity of this portion of Scott's Brook will be 70 c.f.s. if a small amount of repairs to the channel is effected at one or two points where tree growth has bulged the side wall and silting of the bottom has occurred.

7. Economic development. - a. North Attleborough is located on U.S. Route No. 1 and is also served by the New York, New Haven and Hartford Railroad. The 1940 U. S. Census states the population of North Attleborough as 10,735. The larger portion of this population is concentrated within 7 percent of the total town area. There are approximately 60 industries in North Attleborough but by far the largest and most widely known is the jewelry industry. The area directly affected by the Scott's Brook flood control problem includes approximately 50 acres of well-developed residential property extending from Broadway to Ten Mile River.

8. Precipitation. - The average annual precipitation in the vicinity of Scott's Brook is about 38 inches and was estimated from a 40-year record at Providence, R. I., which is located about 12 miles south of North Attleborough. The average annual snowfall (unmelted) is 32 inches. The annual precipitation is well distributed throughout the year as indicated by the following table which is derived from the Providence record.

Mean Monthly Precipitation in Inches

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
Depth	3.53	2.90	3.49	3.32	2.81	3.12	3.22	3.29	3.32	2.83	3.09	3.35

9. Critical storms on the Scott's Brook drainage area are in general of the summer cloudburst type or storms of the hurricane type which approach the area from the south. The latter type of storms may cause daily rainfalls considerably in excess of normal monthly averages. Some unusual daily rainfalls of record at Providence are listed below:

Date	Daily Rainfall in Inches
16 Sept. 1932	6.17
14 Sept. 1944	5.60
10 Sept. 1924	4.85
18 Sept. 1936	3.99
24 Aug. 1927	3.84
23 July 1922	3.83
28 July 1911	3.77
26 Aug. 1924	3.76
3 Sept. 1905	3.40
31 Oct. 1939	3.30
28 Nov. 1937	3.28
20 Oct. 1906	3.13

10. Runoff. - There are no records of runoff on Scott's Brook which has too small a contributing area to be of any interest from the standpoint of water supply or water power development. Estimates of probable flood runoff are given in paragraph 11 below.

11. Floods. - The local flood control problem is caused by flash floods which produce discharges in excess of the capacity of the stream channel and culverts and cause flooding of streets, cellars of nearby residences, a greenhouse and other property. These floods have occurred at least once every year and sometimes more often, with very little warning. There are no flood records available. Probable peak rates and volumes of flood runoff with corresponding frequency for critical storm durations were estimated from the rainfall records mentioned in paragraph 8 above and are given in the following table:

ESTIMATED FLOOD RUNOFF

Freq. (years)	Peak Discharge in C.F.S.	Volume of Runoff in Inches
2	186	0.8
5	265	1.1
10	330	1.5
25	573	2.9

12. A peak runoff of 230 c.f.s. was estimated from known high-water mark at the railroad culvert. This high water mark was pointed out by the Superintendent of Public Works of North Attleborough. It was about elevation 221 feet above M.S.L. and represented 3.5 feet surcharge on the upstream side of the railroad culvert. At the time the railroad embankment with its culvert was operating as a detention basin and because of storage effect, the peak inflow from Scott's Brook was probably considerably in excess of the computed outflow of 230 c.f.s. at the railroad culvert.

13. Extent and character of flooded areas. - The principal flooded areas consist of the area in the vicinity of Washington Street culvert including the State highway, the Fisher Estate below Washington Street and numerous cellars in the vicinity of Scott's Brook channel from the railroad embankment to Washington Street. At various times flooding of Washington Street has reached a depth of 1 to 1.5 feet over the crown of the highway. Channel capacities at Broadway and Avery Street have been exceeded without material damage as the overflow returned to the stream below. The problem is complicated by partial blocking of culverts by formation of ice in winter. It is estimated that direct damages from experienced floods have averaged at least $1,000 annually, of which about one-half was suffered by the Fisher Estate. More disastrous floods than have ever been experienced can occur from the drainage area. Loss of life is not likely, however a hazardous condition may be created by flooding a through highway. The washout of the railroad embankment and the undermining of several residences are possibilities. Rare storms of heavy intensity would cause flooding of the Fisher Estate from Ten Mile River in addition to the damage caused by Scott's Brook.

14. Existing flood control projects. - There are no existing flood-control projects on Scott's Brook.

15. Improvement by other Federal and non-Federal agencies. - The only improvement of any type has been the installation, by the Town of North Attleborough, of an automatic sump pump in the residence of one of the most frequent sufferers from cellar flooding.

16. Improvement desired. - The Town of North Attleborough has appointed a committee on flood control with authority as follows:

> "That the Board of Selectmen appoint a Committee of three to investigate the advisability of installing a dam and reservoir on Scott's Brook for flood control, to determine a proper location for same and whether the storage thus provided will be sufficient to give the desired relief, such committee to report to the Selectmen

with recommendations and costs for consideration at the next Annual Town Meeting of March, 1946."

17. On 14 June 1945 a reconnaissance was made by engineers representing the Providence District who met the following local officials by appointment:

Lester E. Welch, Chairman, Board of Selectmen

Frank Westcott, Chairman, Committee on Flood Control

Nathan Phipps, Superintendent of Streets and Member of Committee

August Funk, Clerk, Board of Selectmen and Town Treasurer

18. The project as proposed by local authorities would consist of an earth dam and detention basin located across the stream channel immediately upstream from the existing railroad culvert. The dam would be located on property owned by the Town. Ungated outlet conduits would be provided at a point opposite the existing railroad culvert. These conduits would be of such capacity as to limit the normal outflow to a discharge not in excess of the channel capacity of Scott's Brook between the dam and Ten Mile River.

19. The local authorities considor that such a project would eliminate damages resulting from freshets of magnitudes that occur every year or two. Freshets of lesser frequency and greater magnitudes are hazards which local authorities feel cannot be avoided at a reasonable cost. In the event that the project is undertaken by the United States, the authorities have indicated that the Town is willing to contribute up to 50 percent of the total costs involved.

20. Discussion. - The flooding caused by Scott's Brook in the populated section of North Attleborough is due to the channel and culvert constrictions. Three general methods of eliminating the flood conditions are:

(1) Construction of an improved channel from the railroad embankment to Ten Mile River. This would involve the reconstruction of several culverts and very high property damage at several places along the brook. Estimates indicate that the cost would be prohibitive.

(2) Construction of a pressure conduit to discharge the entire flow. This would eliminate the open channel brook, which is an asset and attraction to the adjoining property owners and in particular to the Fisher Estate below Washington Street. It is undesirable.

(3) Construction of a dam and detention reservoir above the railroad embankment as desired by local authorities. The feasibility of this method of flood control is discussed in the following paragraphs.

21. The proposed capacity of the detention reservoir at spillway crest would be about 45 acre-feet which is equivalent to only about 0.6 inch of runoff from the contributing area. This capacity would only be sufficient to provide partial modification of the peak inflow from flash floods by detention of the flood volume in the upper part of the runoff hydrograph. For the rarer floods the basin would fill and discharges would take place over a relief spillway. The excess runoff would pond behind the railroad fill, and drain off through an existing underpass south of Scott's Brook and eventually reach Ten Mile River. It is estimated that the detention basin would be filled on the average about once in 3 years and that some inconvenience and damage from spillway discharges would occur on the average of once in 6 years.

22. Conclusions. - Flooding from Scott's Brook and resulting damage to adjacent residential property in North Attleborough has occurred at frequent intervals. Flooding of a main highway and adjacent sewers has become a nuisance to the Town. The railroad embankment has been threatened with destruction on at least one occasion. Potential flood losses would be considerable should a more serious flood occur than has ever been experienced. The affected area is developed residentially and industrially to such an extent and the gradient of the stream is so steep that the only feasible scheme of flood protection is by a small detention reservoir upstream from the tracks of the New York, New Haven and Hartford Railroad. The scheme will only provide partial protection but it is considered that a large part of the annual damages can be eliminated at a reasonable cost.

23. Recommendation. - It is believed that further investigation and report on the locality is warranted by the United States at this time and therefore a survey is recommended.

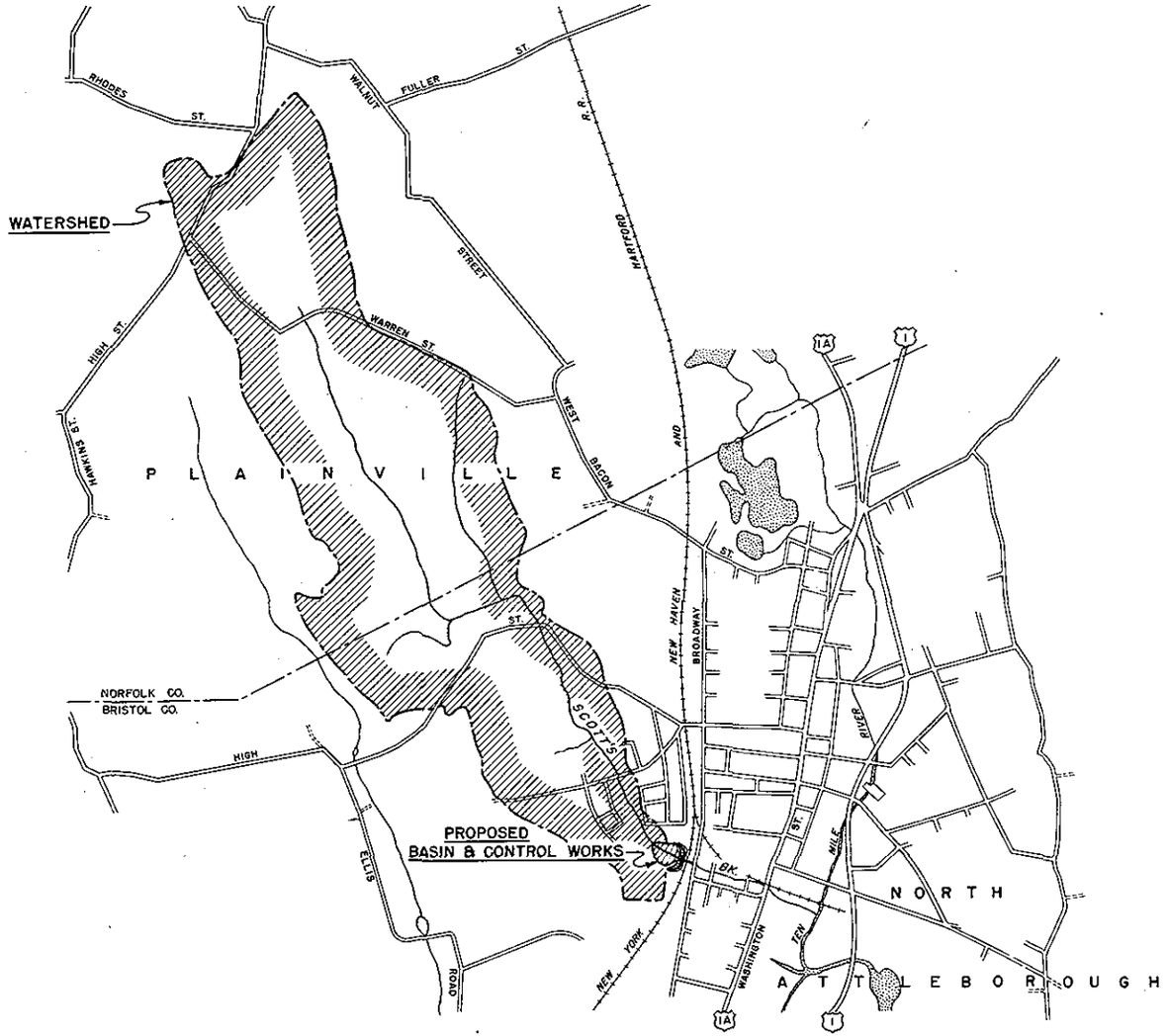
T. F. KERN
Colonel, Corps of Engineers
District Engineer

3 Inclosures:
#1 - Index Map
#2 - Plate No. 1
#3 - Plate No. 2

WAR DEPARTMENT

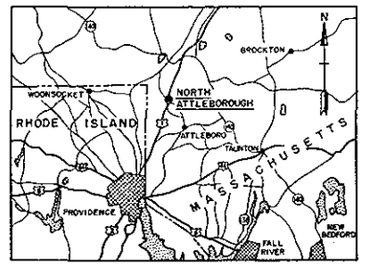
CORPS OF ENGINEERS, U. S. ARMY

PLATE NO. 1



PLAN

SCALE 1" = 1000'



VICINITY MAP

SCALE 1 IN. = 8.3 MI.

8.3 0 8.3 16.6

INDEX TO DRAWINGS

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1	PLAN OF WATERSHED	BE-1-1011
2	PROFILE	BE-1-1012

BLACKSTONE RIVER FLOOD CONTROL

SCOTT'S BROOK

PLAN OF WATERSHED

NORTH ATTLEBOROUGH MASSACHUSETTS

IN 2 SHEETS SCALE: 1 IN. = 1000 FT. SHEET NO. 1

1000' 0 1000' 2000'

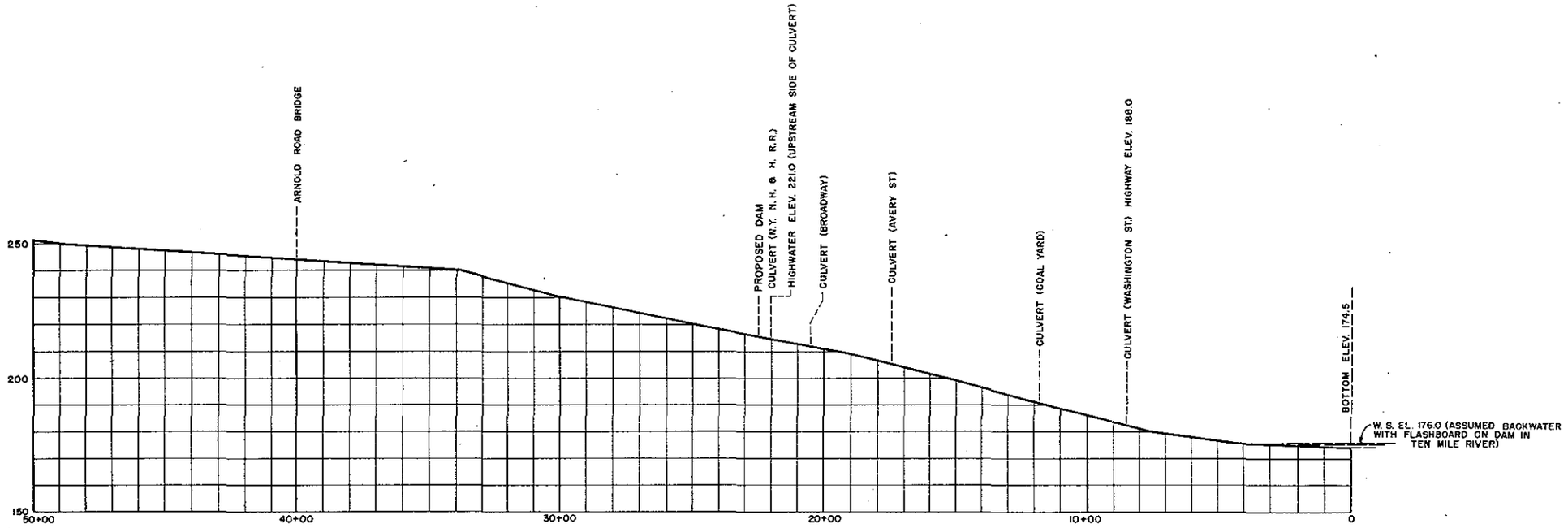
U.S. ENGINEER OFFICE, PROVIDENCE, R.I., DEC. 1945

SUBMITTED: SENIOR ENGINEER

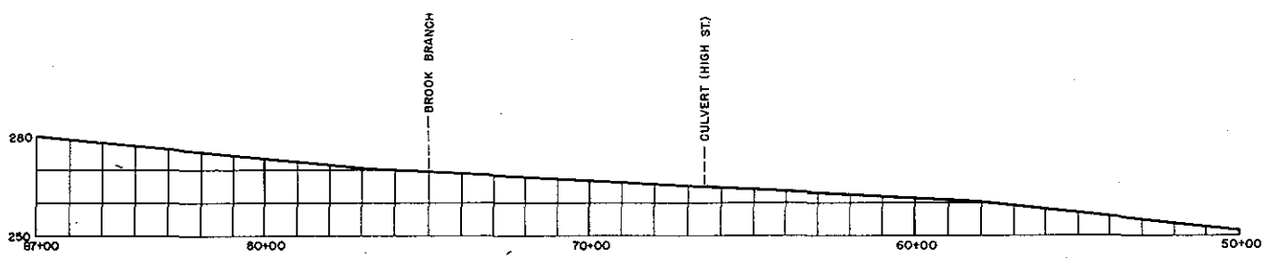
APPROVAL RECOMMENDED: SENIOR ENGINEER

APPROVED: DIST. CORPS OF ENGINEERS

PLATE NO. 2



SCOTT'S BROOK



SCOTT'S BROOK (Continued)

NOTE

Profile data obtained from U.S.G.S. sheet. Attleboro Mass. Quadrangle edition of 1943

BLACKSTONE RIVER FLOOD CONTROL

SCOTT'S BROOK

PROFILE

NORTH ATTLEBOROUGH MASSACHUSETTS

IN 2 SHEETS SCALE: HOR. 1 IN. = 200 FT. VER. 1 IN. = 20 FT. SHEET NO. 2

U.S. ENGINEER OFFICE, PROVIDENCE, R.I., DEC. 1945

SUBMITTED: E.C. Williams, DISTRICT ENGINEER

APPROVAL RECOMMENDED: H.J. Lucker, ACTING DIVISION ENGINEER

APPROVED: Wilson, CHIEF, CORPS OF ENGINEERS